CHARACTERIZATION OF PHYSICAL PROPERTIES KUANTAN BAUXITE

NURMAZURIA BINTI MAZELAN

B.ENG (HONS.) CIVIL ENGINEERING

UNIVERSITI MALAYSIA PAHANG

STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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(Student's Signature)

Full Name : NURMAZURIA BINTI MAZELAN

ID Number : AA15157

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NURMAZURIA BINTI MAZELAN

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ABSTRAK

Di Kuantan terdapat mineral asli dan geokimia bauksit yang telah terbentuk, namun kurang pengetahuan dan pengalaman dalam mengendalikan bauksit telah menyebabkan pencemaran udara dan air di sekitar kawasan tersebut. Aktiviti di kawasan bauksit telah diharamkan oleh kerajaan atas dasar keselamatan dan kesihatan penduduk setempat sebelum ini. Kini kerajaan telah memutuskan untuk membina kawasan pembangunan baru di tanah bauksit tersebut. Bauksit adalah batu yang mengandungi banyak komposisi dan berlaku dalam banyak struktur yang berbeza. Satu kajian telah dibuat untuk mengetahui sifat-sifat fizikal bauksit di sesetengah kawasan di dalam daerah Kuantan dan kajian ini adalah untuk penyelidikan di masa hadapan mengenai bauksit di Kuantan. Ujian makmal telah dilakukan di tiga kawasan yang berbeza iaitu Semambu, Bukit Goh dan Indera Mahkota. Sifat-sifat fizikal bauksit di daerah Kuantan tersebut akan dikenalpasti melalui ujian kandungan kelembapan tanah, particle size distribution, atterberg limit dan specific gravity. Dengan merujuk jurnal dari penyelidik pada tahun sebelumnya, thesis ini telah mencapai objektif.

ABSTRACT

In Kuantan there was an origin mineral and geochemistry of Bauxite had been formed, however less knowledge and experience in handling the Bauxite had cause air and water pollution around the Bauxite area. The Bauxite area has been banned once but the government of Kuantan had decided to construct a new development area on the Bauxite soil. This study, as it can be specify the bauxite is a rock that contain a lot of composition and it takes place in different texture in form. An investigation of engineering characterization and physical properties of the bauxite had been carry out at different site in Kuantan for future research about Kuantan bauxite. Laboratory test had been done at three different sites where the sites is at Semambu, Bukit Goh and Indera Mahkota. This investigation is to identify the physical properties of the bauxite at Kuantan sites by do the lab test of moisture content, particle size distribution, atterberg limit and specific gravity. The result had been compared and refers from the other researchers and journal to prove whether this research had achieve the objective or not. Referring to the other researchers and journals, this research objective had been achieved and prove that the result of bauxite sample that had been taken for laboratory testing was in the range of bauxite soil.

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LIST OF ABBREVIATIONS

PLAN	Federal Department of Town and Country Planning
ASTM	American Society of Testing and Material
IMSBC	International Maritime Solid Bulk Cargoes

CHAPTER 1

INTRODUCTION

1.1 Background of Research

Residual rock called ‘Bauxite’ were formed from the weathering of various igneous, sedimentary, and metamorphic rocks. These rocks have been exposed to long periods (millions of years) of weathering under tropical, subtropical, or very wet temperate conditions. Ninety percent of bauxite resources in the world are mostly in tropical area. Other deposits outside these latitudes have been exposed to long periods of intense weathering in their geologic past(Hasan et al, 2018). The most common country that consist a large amount of bauxite are in Central and South America, in West Africa, in particular Guinea, and then in India, Vietnam, and Australia. Some of the bauxite also available in the north of Russia and in the centre of Saudi Arabia. The bauxite resource had been estimated and it was more than 70 billion tonnes of bauxite in the world. Of this the greatest concentration is in Guinea, where there are well-proven resources of approximately 25 billion tonnes (Description & Risks, 2014). Most of the bauxite was occurred close to the surface, with only 1 or 2 m of overburden and typical range of the thickness is between 3 to 15 m.

Bauxite is a type of rock that majority of it contain ore alumina and it had been recognized at the end of the nineteenth century that the rock is also contain other composition which include Gibbsite (aluminium hydroxide, Al (OH)3), Boehmite, Diaspore, A10 (OH), goethite and haematite, kaolinite (aluminium silicate, Al2Si2O5(OH)4) and a small quantity of anatase (titanium oxide, TiO2)(Plunkert, 2003).This rock called bauxite normally have a typical soft texture (Mohr’s Hardness: 1-3) and it has a low specific gravity (Gs: 2.0-2.5). The colour of the bauxite is white to grey to reddish brown and sometimes stained yellow or brown by iron of combination

colours, but the majority colour of bauxite is reddish brown and it is because of the presence of iron mineral in it.

This study is to investigate whether the bauxite is suitable or strong enough to hold an engineering structure for a long term period. The strong and stable soil is important when it is comes to a building especially the foundation part. Different type of soil has their own characteristic of strength and physical properties. The lower the strength, the less stability the stability of the soil that can cause cracking, sinking and settlement effect. Certain skyscraper and tower had been supported by the soil because of a high strength of soil. This is became texture of soil consist relative proportions of various particle sizes such as sand, silt and clay. In this study, as it can be specify the bauxite is a rock that contain a lot of composition and it takes place in different texture in form. So this study is an investigation of engineering characterization and physical properties of the bauxite that will be carry out at different site in Kuantan.

1.2 Problem Statement

Bauxite in Kuantan had become an environmental issue in Malaysia due to the pollution of air, redness of water. Gebeng and Bukit Goh are the main source of Aluminium ore in Kuantan that had been ban by the government. From that particular problem, Kuantan municipal council and Federal Department of Town and Country Planning (PLAN) Malaysia are on a planning of Kuantan 2035. There will be more development of construction and land use in this urban area. This study is to know whether the bauxite soil is suitable or not to be used as a residential area.

Therefore, a case study need to be done to provide more information about the bauxite soil engineering and physical properties of the bauxite in Kuantan. This study is to obtain information whether the bauxite in Kuantan is safe to be used for developed a building area and to be confirm by the Geotechnical design.

1.3 Objective of Study

This research is to investigate and identify the geotechnical properties of raw and processed bauxite in Kuantan area. The sample that will be test are from Gebeng and Bukit Goh bauxite area. Then, it can be conclude whether the bauxite could be used as a housing area or not.

i. To determine the physical properties of the bauxite in Kuantan.
ii. To compare the sample of bauxite at different site in Kuantan.
iii. To analyse the physical properties by graph and data that will be obtain.

1.4 Scope of Study

This research is carry out by a full laboratory test to explore more about the properties of Kuantan bauxite. The sample of Bauxite ore were taken from Gebeng and Bukit Goh which are located 39km and 23km from Kuantan. Three samples had been taken at both location at difference spots.

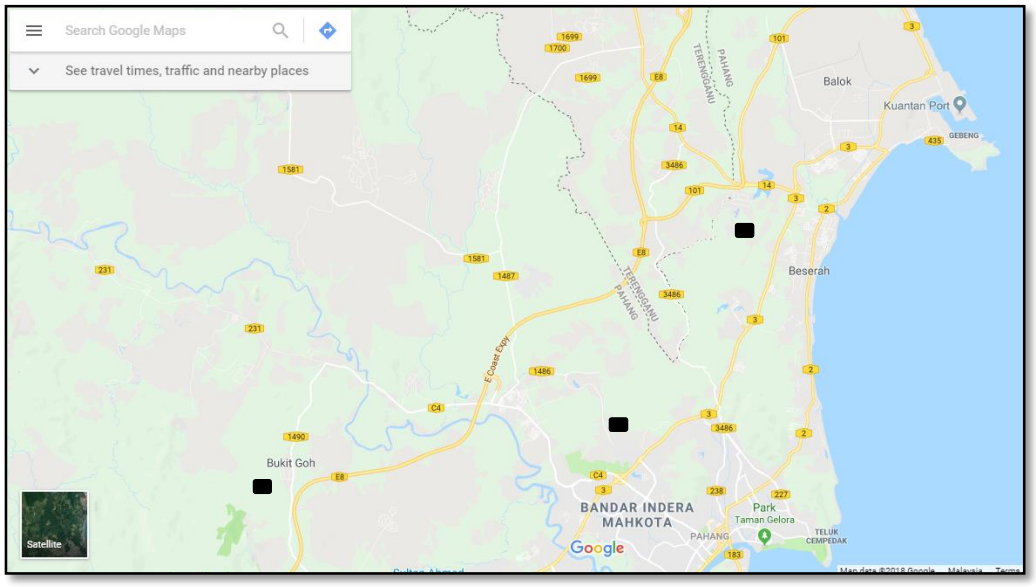

Figure 1.1 Bauxite sample location

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